



At left above, Arizona crop duster Gary Owens is about to board his agricultural airplane. In Arizona, most crop dusting work is done in the late afternoon or evening, so Owens' plane has been exposed to hot sunlight for hours and the cockpit temperature may be as high as 125 degrees Fahrenheit. And the plane's cockpit is not air conditioned—few are, because of the expense.

Cockpit heat poses a major problem for Gary Owens and others of his profession because elevated body temperature can cause fatigue, dehydration and even collapse, extremely dangerous possibilities to a pilot flying at times only two to four

feet above the vegetation (above). But Gary Owens has an answer; in July 1985 he became the first crop duster to purchase a Cool Head™ personal cooling system from Life Support Systems, Inc. (LSSI), Mountain View, California.

At far right, Owens models the Cool Head system. He is wearing a lightweight vest unit through which cooling liquid circulates and, under his flight helmet, he has a companion cooling headliner. Visible in the

cockpit is the portable cooling package, which includes a heat exchanger that cools the working fluid circulated through vest and headliner, and a control display unit containing a pump, a liquid reservoir, temperature control and power unit. Cool Head can operate from its own rechargeable battery or from the airplane's—or other vehicle's—power system. With Cool Head, says LSSI, 40 to 60 percent of body heat storage caused by high temperature can be eliminated and heart rate can be lowered by 50 to 80 beats a minute.

Cool Head user Gary Owens calls it "a winner." In a letter to LSSI, he wrote: "I



don't sweat at all with the Cool Head system. This makes me more comfortable, more alert, less fatigued and provides much greater safety in flight. For the first time in my (eight year) crop dusting career, I am fresh, alert and without mental pressure."

The Cool Head technology originated in a 1968 NASA development program that produced a channeled cooling garment for space wear. In 1971, NASA's Ames Research Center awarded a

contract to Acurex Corporation for an extension of the technology involving development of a heat stress alleviating liquid-cooled headliner for helicopter pilots. In the mid-1970s, NASA and the Bureau of Mines jointly sponsored an Acurex program for development of a self-contained cooling system for mine rescue workers. In 1980, William Elkins, formerly with Acurex and long associated with cooling system research, formed LSSI to pursue commercial uses of the technology.

Cool Head personal cooling systems have been acquired by the Army and the Air Force for use by personnel who must perform arduous work while wearing hot and bulky protective gear, such as garments to prevent contact with chemical/bacteriological warfare agents. Cool Heads have also been bought by the U.S. Navy for evaluation in helicopters and light aircraft, and by military units of foreign governments.

Among commercial applications are use by employees susceptible to on-the-job heat stress in such industries as primary metals reduction, deep mining, chemicals, paper and glass. Other commercial uses include personal cooling for

heavy equipment operators and workers wearing toxic waste clean-up suits. Cool Head is also being used by a number of auto racing drivers, notably Paul Newman of motion picture fame and Bill Elliott.

Additionally, Cool Head is being evaluated by NASA's Research Triangle Institute (North Carolina) Technology Applications Team, which is conducting a program to utilize aerospace-derived technology to improve on-board equipment in public service helicopters, such as those engaged in law enforcement, search and rescue, drug enforcement, border patrol and forest service activities. The NASA application team and LSSI are working to identify possible improvements in the Cool Head system that would enhance its utility in the public service helicopter application. ▲



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